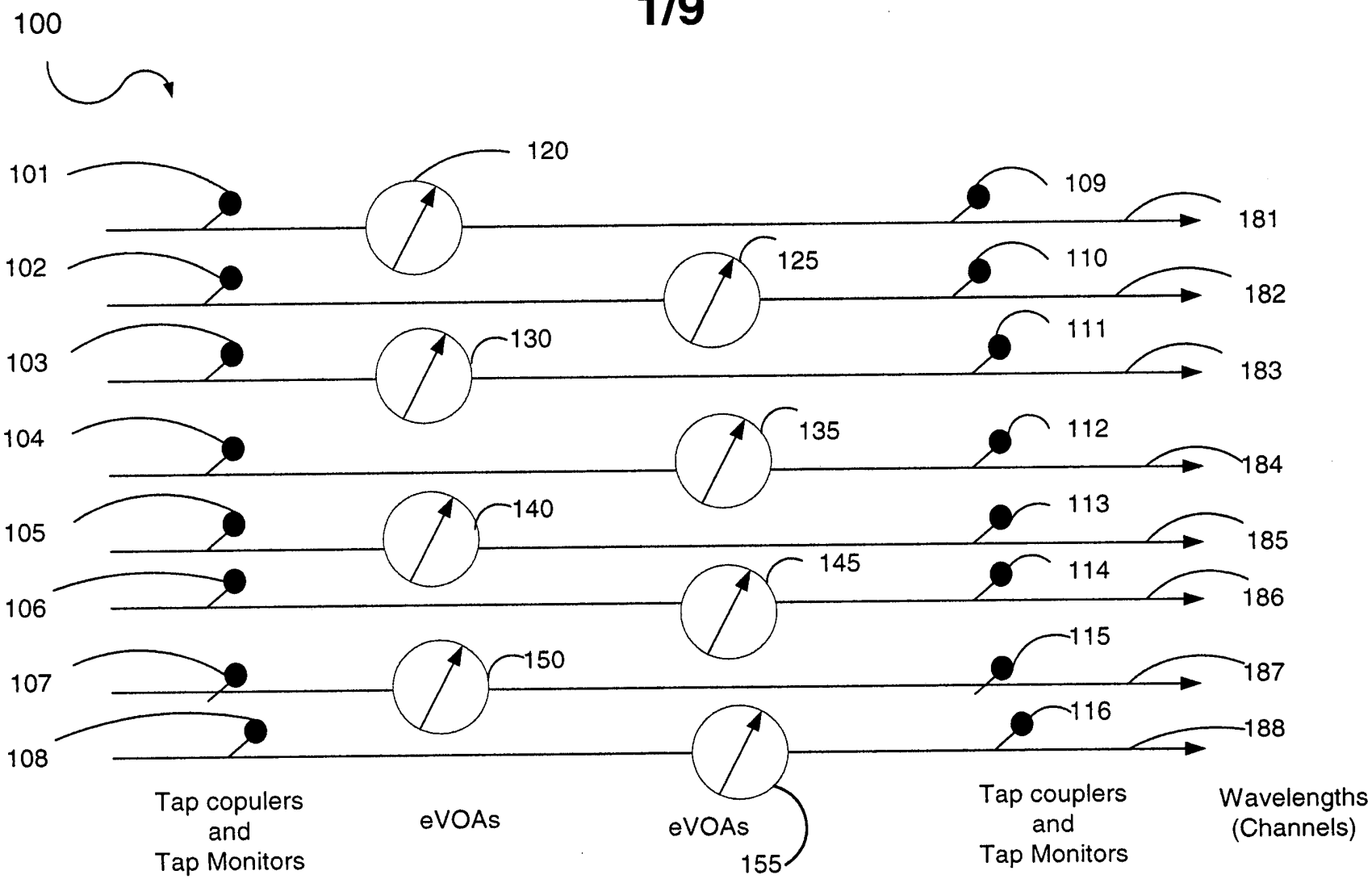

Figure 1 Prior Art

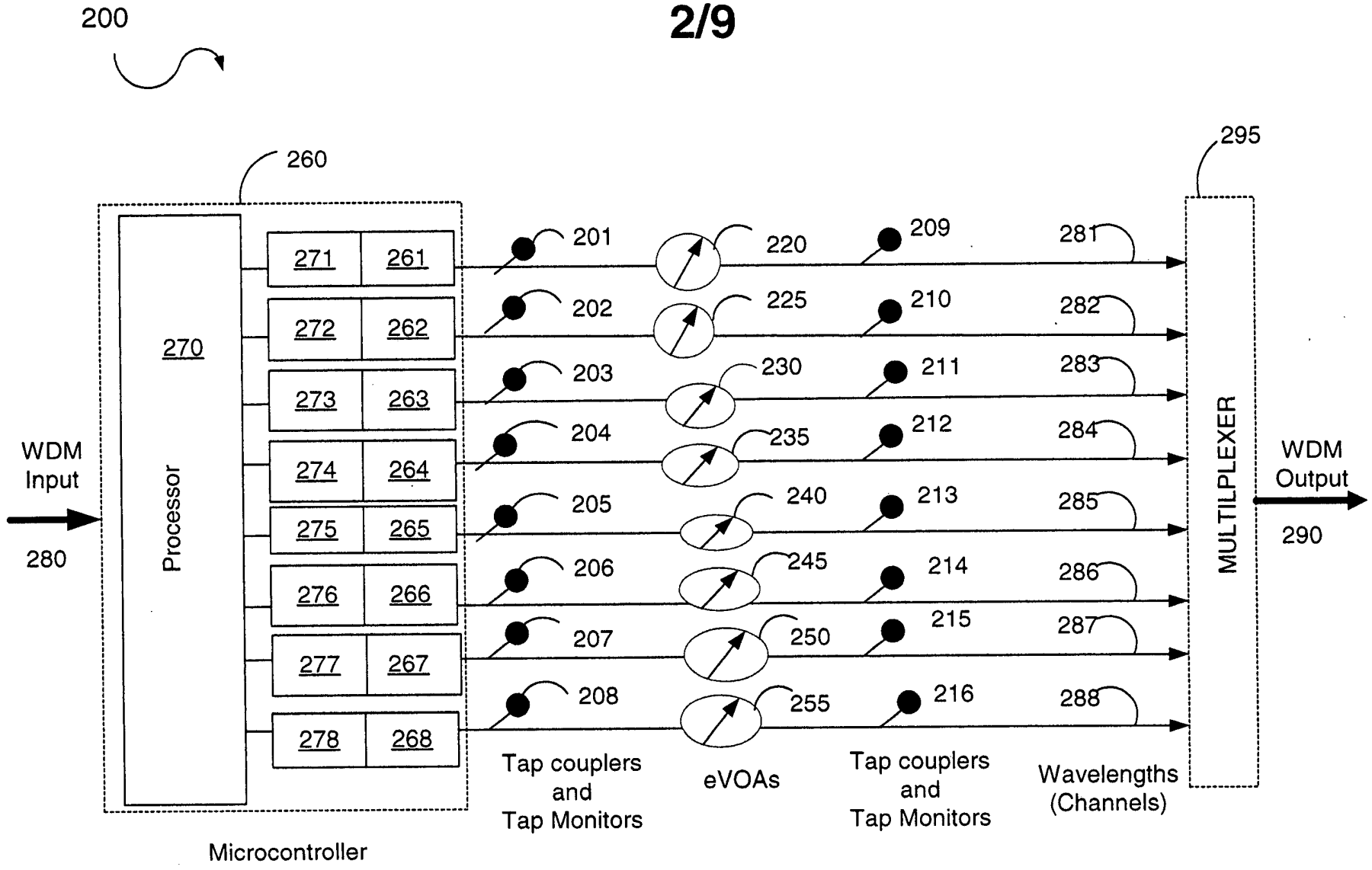

Figure 2 Prior Art

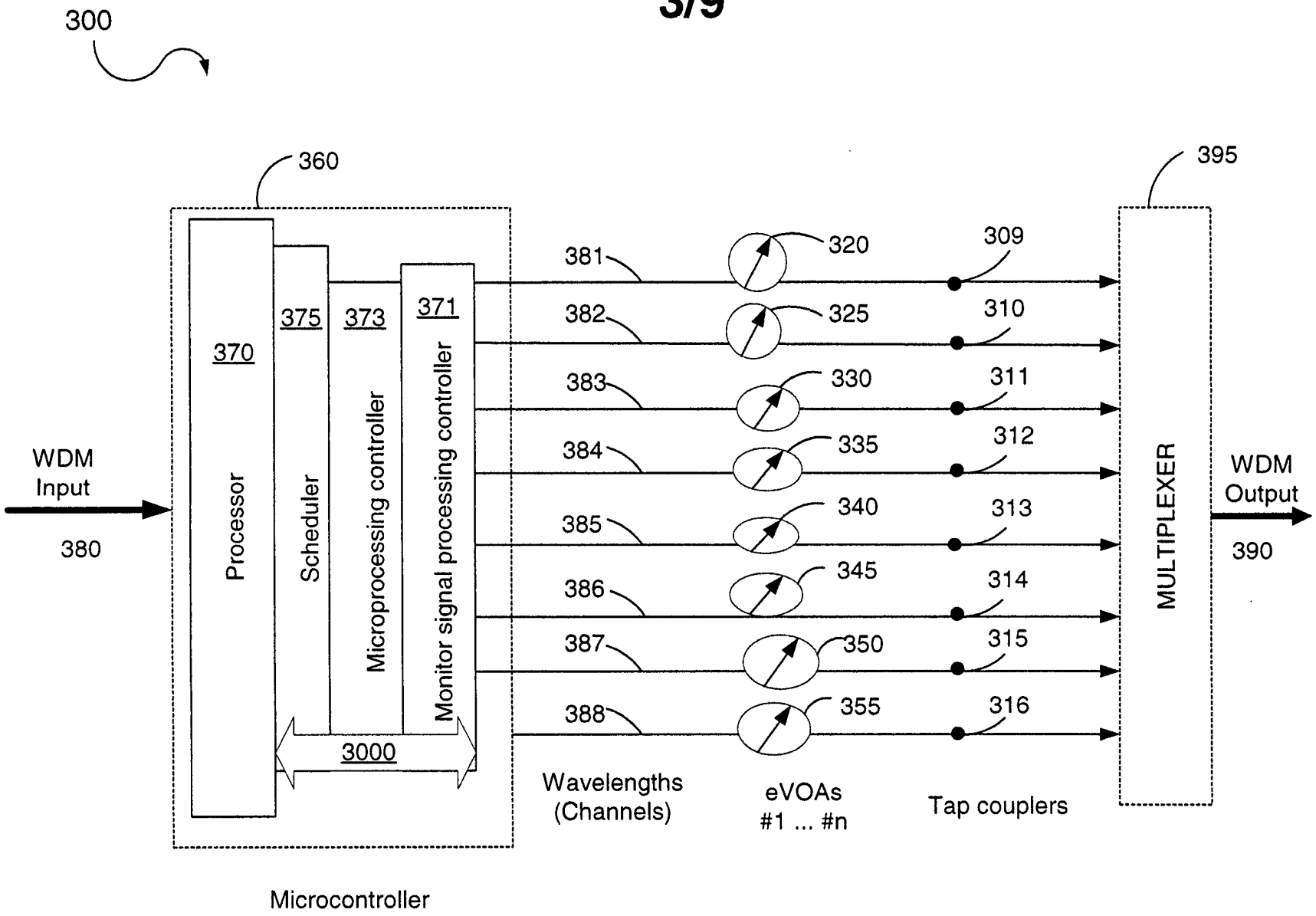
300
360
395
370
Processor
375
Scheduler
373
Microprocessing controller
371
Monitor signal processing controller
3000
Microcontroller
WDM
Input
380
381
382
383
384
385
386
387
388
320
325
330
335
340
345
350
355
309
310
311
312
313
314
315
316
Wavelengths
(Channels)
eVOAs
#1 ... #n
Tap couplers
MULTIPLEXER
WDM
Output
390

Figure 3

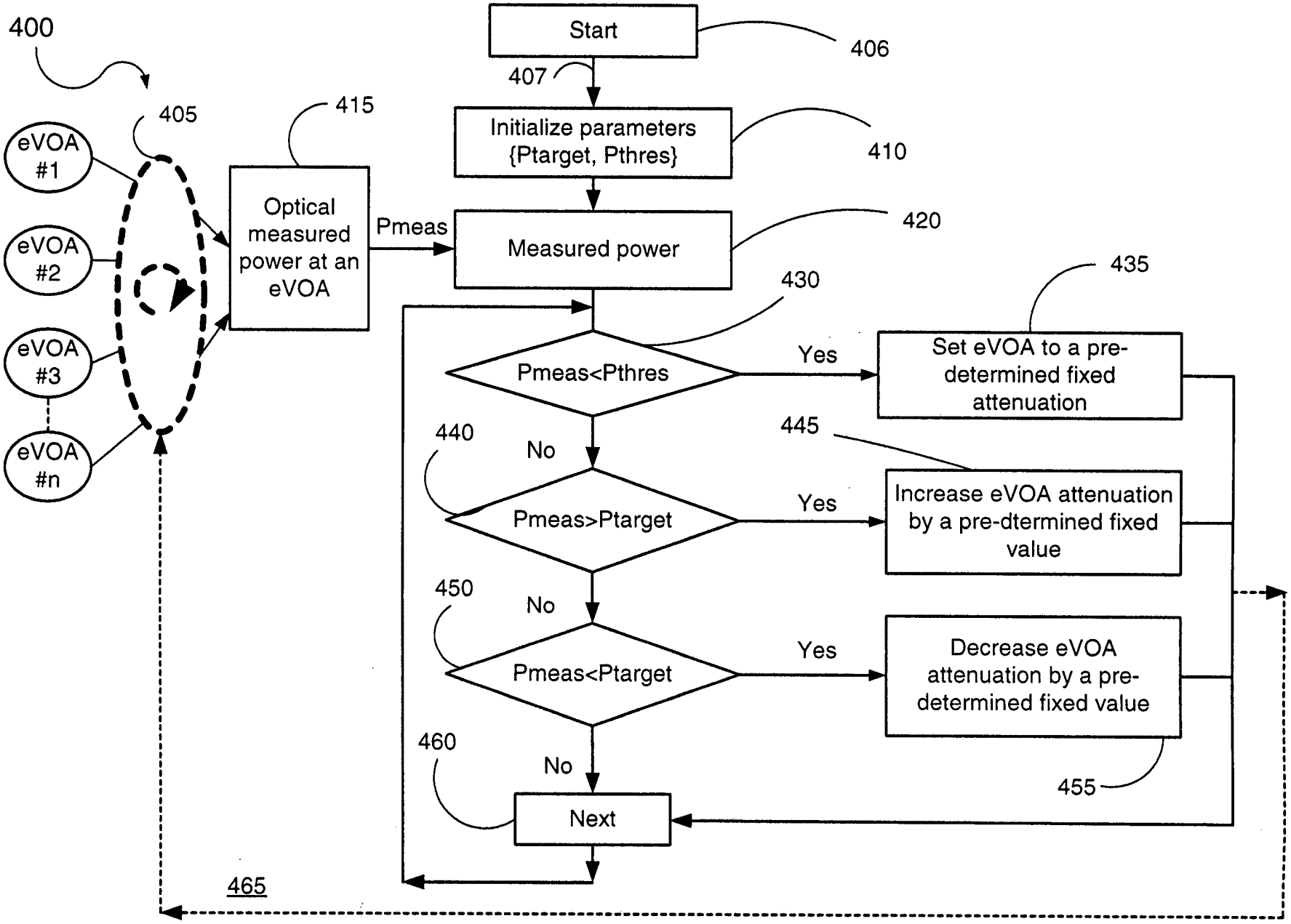
400
405
eVOA #1
eVOA #2
eVOA #3
eVOA #n
415
Optical measured power at an eVOA
Pmeas
Start
406
407
Initialize parameters {Ptarget, Pthres}
410
Measured power
420
430
Pmeas<Pthres
Yes
435
Set eVOA to a pre-determined fixed attenuation
440
No
445
Pmeas>Ptarget
Yes
Increase eVOA attenuation by a pre-dtermined fixed value
450
No
Pmeas<Ptarget
Yes
Decrease eVOA attenuation by a pre-determined fixed value
455
460
No
Next
465

Figure 4

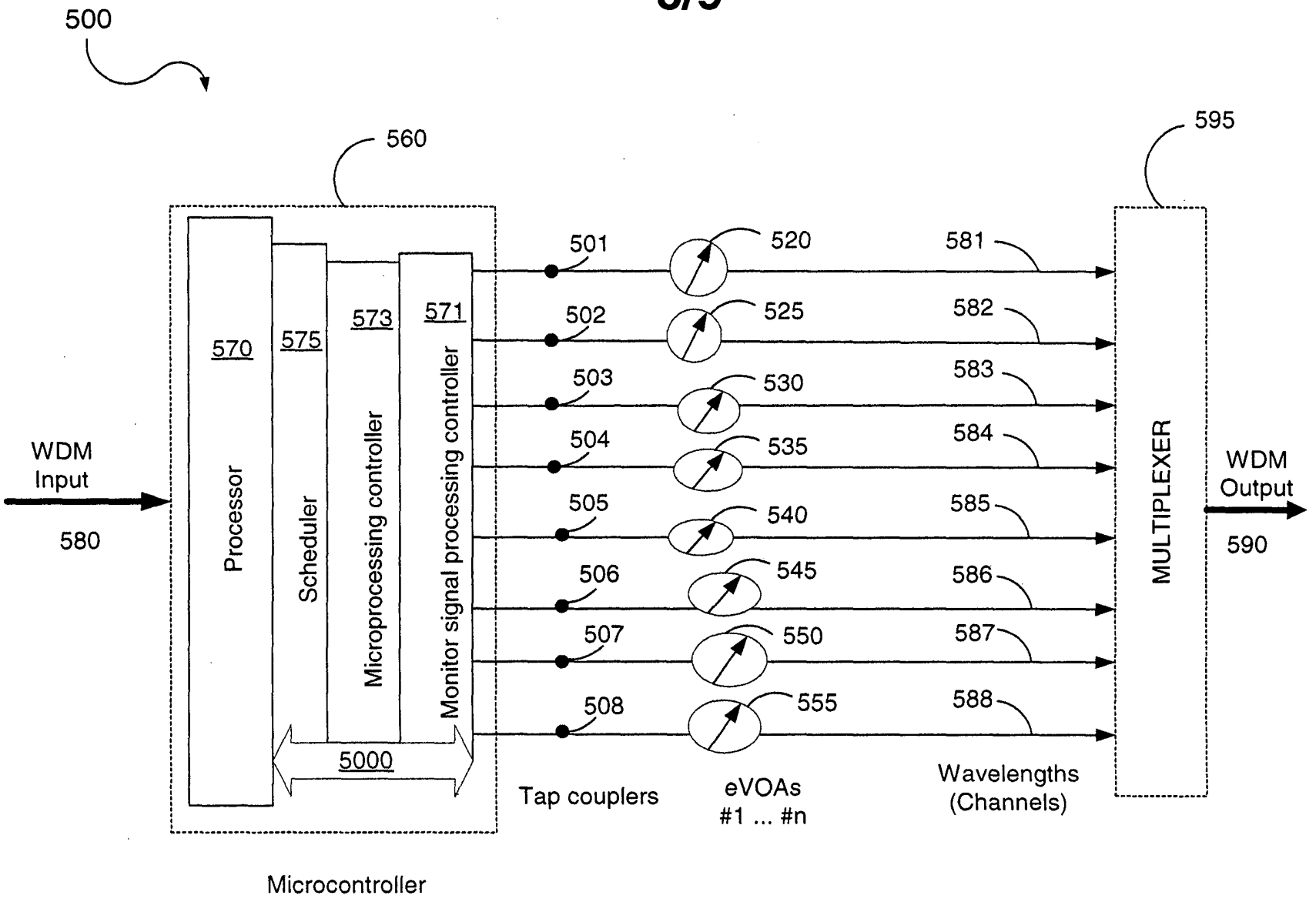
500
560
595
570
Processor
575
Scheduler
573
Microprocessing controller
571
Monitor signal processing controller
5000
Microcontroller
WDM
Input
580
501
502
503
504
505
506
507
508
520
525
530
535
540
545
550
555
Tap couplers
eVOAs
#1 ... #n
581
582
583
584
585
586
587
588
Wavelengths
(Channels)
MULTIPLEXER
WDM
Output
590

Figure 5

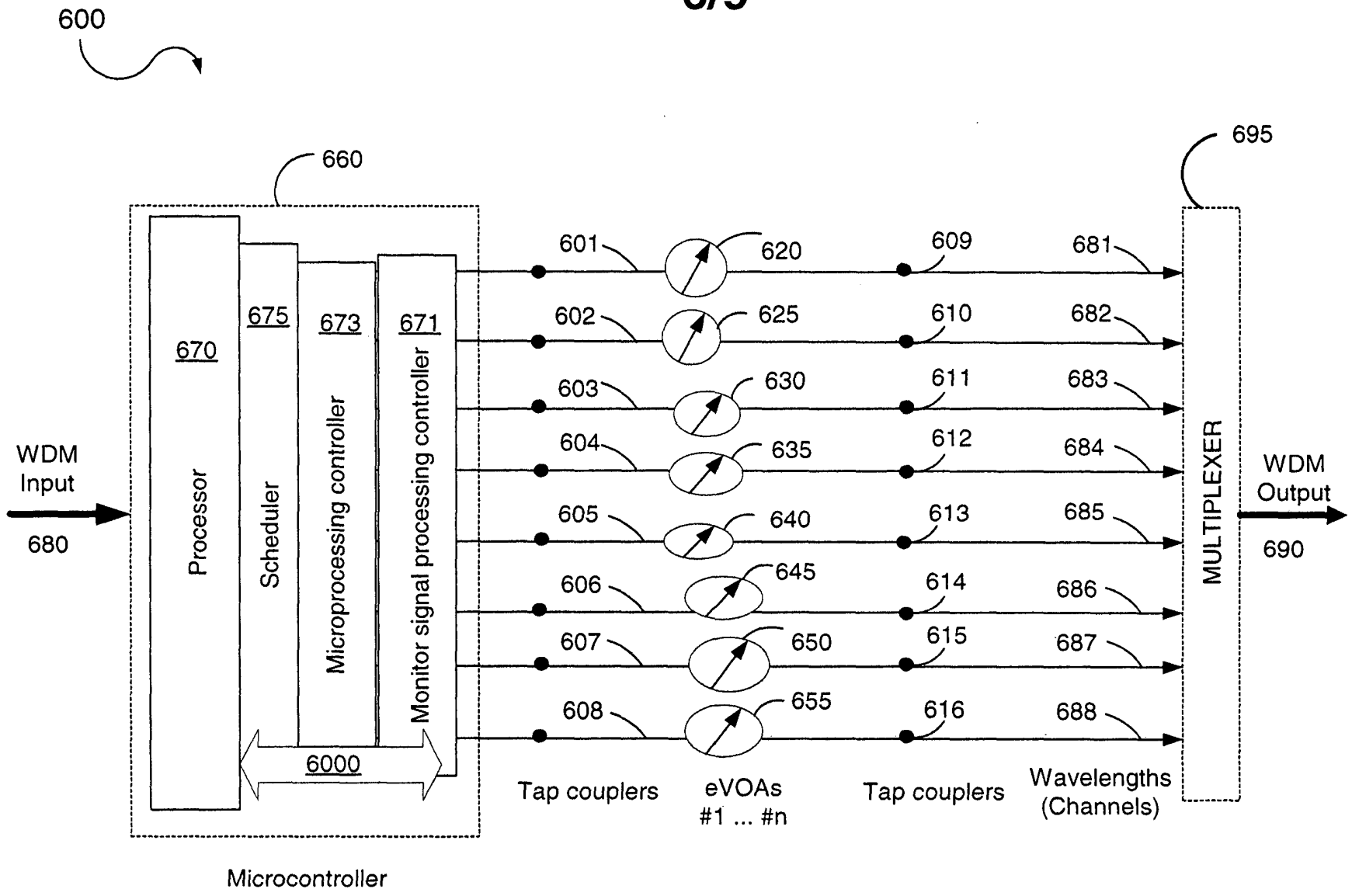
600
660
695
WDM Input
680
670
Processor
675
Scheduler
673
Microprocessing controller
671
Monitor signal processing controller
6000
Microcontroller
601
602
603
604
605
606
607
608
620
625
630
635
640
645
650
655
609
610
611
612
613
614
615
616
681
682
683
684
685
686
687
688
Tap couplers
eVOAs
#1 ... #n
Tap couplers
Wavelengths
(Channels)
MULTIPLEXER
WDM Output
690

Figure 6

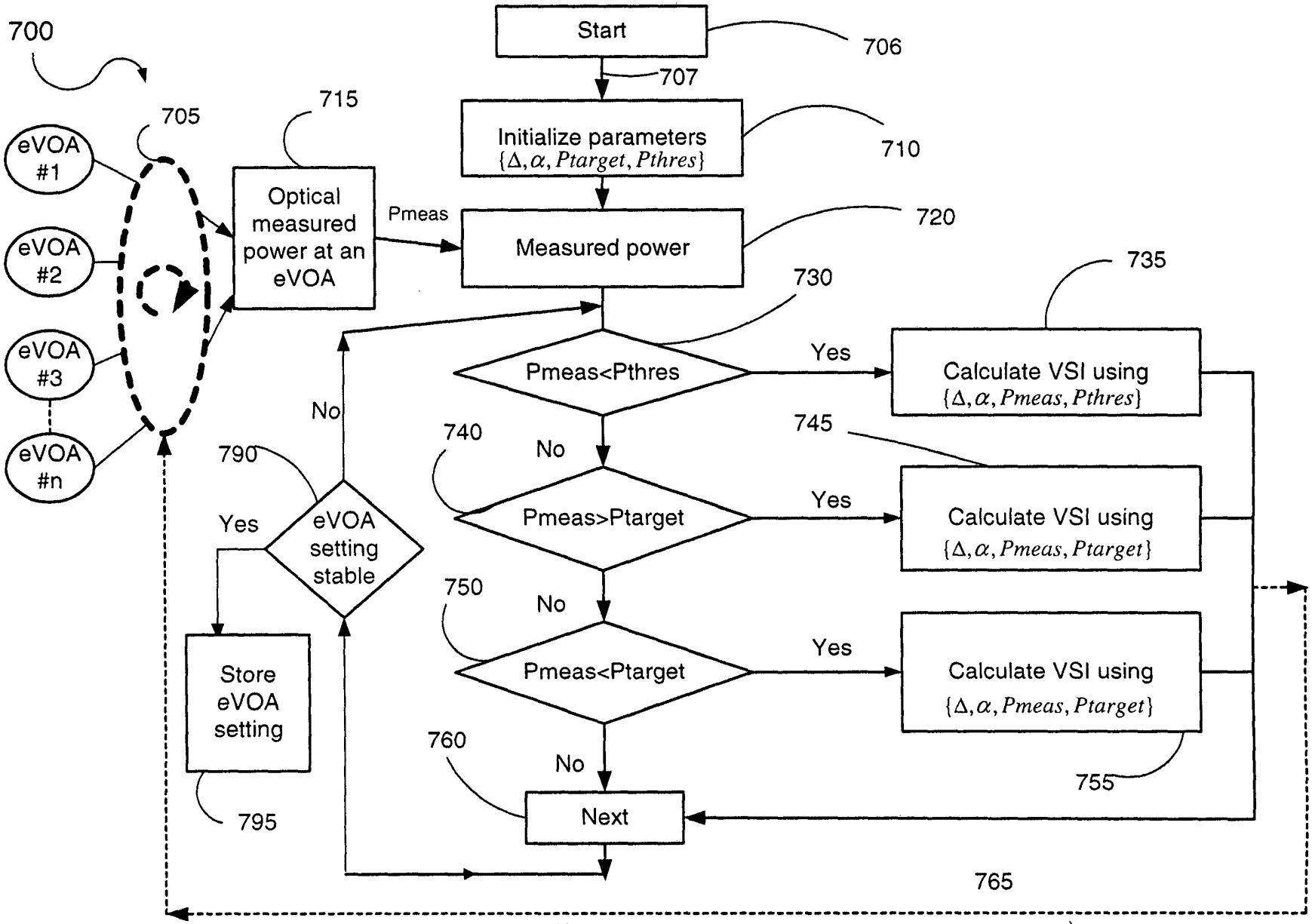
700
705
715
eVOA #1
eVOA #2
eVOA #3
eVOA #n
Optical measured power at an eVOA
Pmeas
Start
706
707
Initialize parameters {Δ, α, Ptarget, Pthres}
710
Measured power
720
730
735
Pmeas<Pthres
Yes
Calculate VSI using {Δ, α, Pmeas, Pthres}
No
740
745
Pmeas>Ptarget
Yes
Calculate VSI using {Δ, α, Pmeas, Ptarget}
No
790
Yes
eVOA setting stable
No
750
Pmeas<Ptarget
Yes
Calculate VSI using {Δ, α, Pmeas, Ptarget}
Store eVOA setting
795
760
No
755
Next
765

Figure 7

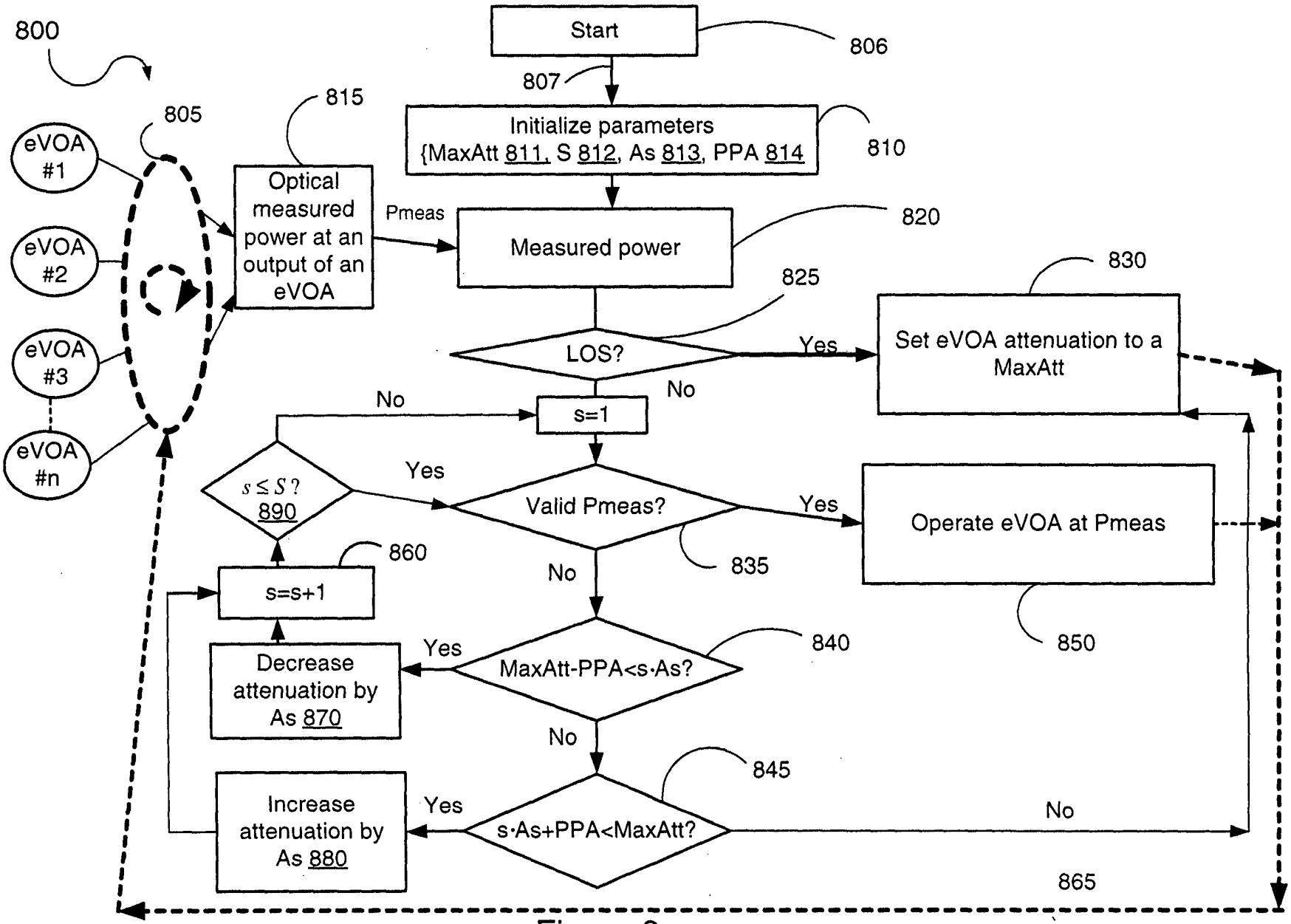
800
805
815
eVOA #1
eVOA #2
eVOA #3
eVOA #n
Optical measured power at an output of an eVOA
Pmeas
Start
806
807
Initialize parameters {MaxAtt 811, S 812, As 813, PPA 814
810
Measured power
820
825
LOS?
Yes
No
830
Set eVOA attenuation to a MaxAtt
s=1
No
Yes
s ≤ S ? 890
Valid Pmeas?
Yes
835
Operate eVOA at Pmeas
850
No
860
s=s+1
Decrease attenuation by As 870
Yes
MaxAtt-PPA<s·As?
840
No
845
Increase attenuation by As 880
Yes
s·As+PPA<MaxAtt?
No
865

Figure 8

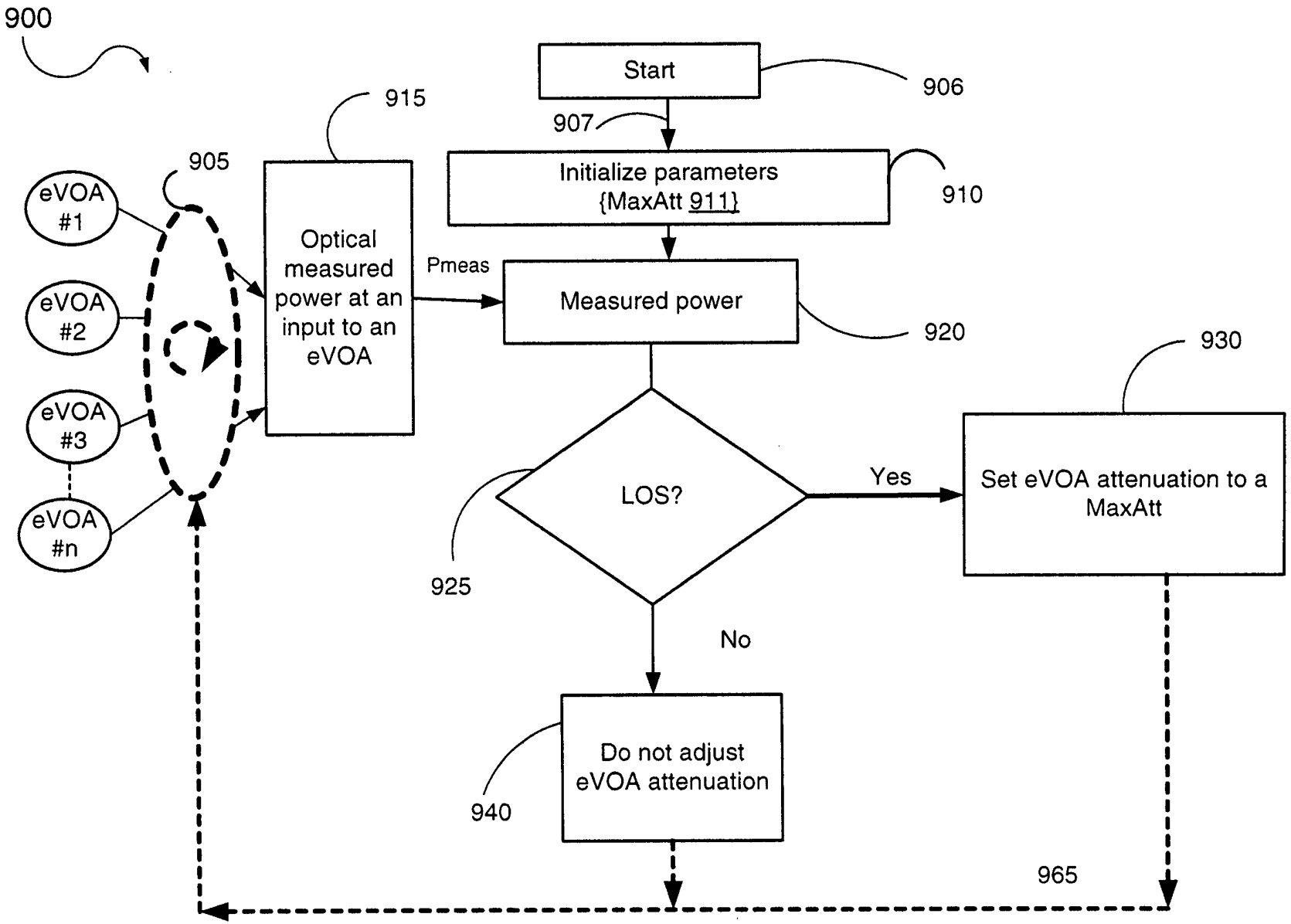
900
Start
906
907
915
905
Initialize parameters
{MaxAtt 911}
910
eVOA #1
eVOA #2
eVOA #3
eVOA #n
Optical measured power at an input to an eVOA
Pmeas
Measured power
920
930
LOS?
Yes
Set eVOA attenuation to a MaxAtt
925
No
Do not adjust eVOA attenuation
940
965

Figure 9